Available online at www.sciencedirect.com

ScienceDirect

Procedia - Social and Behavioral Sciences 109 (2014) 438 – 442

Procedia Social and Behavioral Sciences

2nd World Conference On Business, Economics And Management- WCBEM 2013

The Role of Reverse Logistics in the Concept of Logistics Centers

Ramazan Kaynak [a]*, İpek Koçoğlu [b], Ali Ekber Akgün [c]

[abc] *Gebze Institute of Technology Faculty of Business Administration, Cayirova Kampusu, Kocaeli, 41400, Turkey*

Abstract

Purpose- The purpose of this research is to identify the barriers faced in the adoption of reverse logistics (RL) and the respective overcoming schemas provided by the logistics centers (LCs). However the lack of awareness on the benefits of the RL both from economic and environment angles is a major factor creating the resistance to complement the logistics activities with RL.
Methodology- This study follows a literature research approach in investigating the intersecting and mutually constitutive aspects of LCs and RL and offers a theoretical systematic infrastructure for the firms to be encouraged in engaging with RL through the establishment of LCs.
Findings- The consolidation of RL functions under the organized structure of LC would provide a wide range of opportunities and benefits for the organizations. The five major aspects endowed by the construction of a logistics village and the inclusion of RL activities in this central organizing, operational and administrative hub are; coordination and cooperation, centralization, consolidation, 3rd party RL collaboration and integration.
Conclusion- Along with the opportunities, the barriers in front of the establishment of a RL system and the contribution of LCs in overcoming these challenges are discussed.

Keywords: Logistics centers, reverse logistics, coordination, cooperation;

1. Introduction

Supply chains are undergoing radical transformations due to the mega-competition taking place on a global scale (Ravi and Shankar, 2005). Firms are finding that they must deal with a high level of uncertainty, which is not only technical in nature. It has been observed by companies that there is an increase in the flow of returns of the product due to product recalls, warranty returns, service returns, end-of-use returns, end-of-life returns, and so on (Ravi and Shankar, 2005). Overall, the value of returns is estimated to be around $43 billion per year, representing an average of 15%-20% of all goods sold (Genchev, 2009). With continuing pressures to reduce operating costs while often incurring additional costs brought about by environmental restrictions, firms must be concerned with the costs of returning materials associated with the products that they deliver (Alshamrani et al., 2007).

The concept of RL has received growing attention in the last decades, due to competition and marketing motives, direct economic motives and concerns with the environment. With the legislative measures tightening up, there are not many options left with the companies, but to go to RL practices. New organizational paradigms have been created as ecological and environmental issues play a more important role in cooperative strategies (Gonzalez-Torre et al., 2004). A critical analysis of the challenges hindering RL activities, the opportunities for increased

* Corresponding Author: Ramazan Kaynak. Tel.: +90-262-605-1427
E-mail address: kaynak@gyte.edu.tr

doi:10.1016/j.sbspro.2013.12.487

performance, cost reduction (for firms involved in LCs) and profit maximization (for 3rd party RL service providers) can develop and exploit the interaction of RL with logistics villages. Hence the various aspects in integrative collaboration can be a valuable source of increased performance for organizations willing to consolidate their RL processes (Ravi and Shankar, 2005). Therefore the current study was undertaken in order to gain new insights about the role of RL in the LC concept by exploring the links between RL capabilities and performance outcomes of LCs.

2. Literature Research

2.1. Reverse Logistics (RL) and Logistics Centers (LCs)

RL is "‘‘the process of moving goods from their typical final destination for the purpose of recapturing value, or proper disposal’’ (Rogers and Tibben-Lembke, 1999, p.2). Horvath et al. (2005) indicates that RL refer to a set of programs or competencies aimed at moving products in the reverse direction in the supply chain (i.e., from consumer to producer). RL involves planning, implementing, and controlling an efficient, cost effective flow of raw materials, in-process inventory, finished goods, and pertinent information from consumption to retrieval or proper disposal of the product (Rogers and Tibben- Lembke, 1998). Figure 1 is a representation of forward and RL flows adapted from Rogers and Tibben-Lembke (1999).

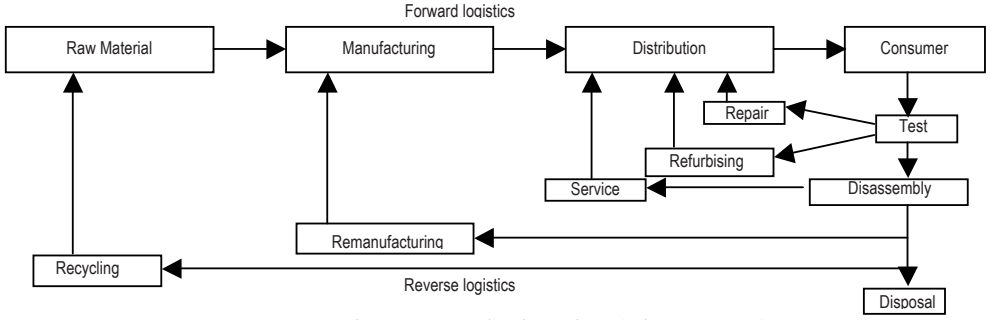

Figure 1. Forward and RL Flows (Srivastava, 2008)

With the progressive increase in environmental concerns, the efficiency focus, importance of value delivery through co-creation and co-production as well as the need for improving core competencies while strategically positioning in the global competitive market, the understanding of RL shifts towards the “coordinated”, “centralized”, “consolidated” and “integrated” network value chain (Flygansvaer et al., 2008). Although RL have large potential for increased performance and improved customer relationship, the potential value of effective RL is often underestimated. Yet, the reason for neglecting to implement a state-of-the-art RL program is cost and control related (Genchev, 2009). RL leads to the fear of losing control over the organizational processes with the extra work involved in its multi-layer steps and results in the reluctance to pioneer a new organizational structure. But it is underestimated that if RL is used effectively it results in improved firm outcomes such as improved customer satisfaction, decreased resource investment levels, and reductions in storage and distribution costs.

LCs are referred to by different names such as logistics village, distribution or distribution-storage center, cargo terminal or central depot. The main terms regarding this concept are; (1) Freight villages in the United Kingdom, (2) Plate Forme Lojistique in France, (3) Interporto in Italy, (4) Transport Center in Denmark, (5) Güterverkehrszentrum in Germany (6) LC in U.S.A., China, Japan and Singapore. There is a twofold approach regarding the understanding of LCs; the first approach identifies a LC as the generator of business, on the opposite the other approach relates it to the transportation infrastructure. The view supporting that LCs are part of the transportation infrastructure defines it as; “the Integrator of various transportation types stimulating intermodal transportation” (Tsamboulas and Kapros, 2003). However in U.S.A., Japan, China, Singapore and some European countries LCs are interpreted as the business generators besides part of the transportation infrastructure. Yet, the concept of LC in reality should be the combination of the two approaches. Europlatforms – the association of the European freight villages (in Italy, France, Spain, Denmark, Germany, Portugal, Luxembourg, Greece, Poland)-

developed the definition of LC as: 'the hub of a specific area where all the activities relating to transport, logistics and goods distribution – both for national and international transit – are carried out, on a commercial basis, by various operators (Iannone et al., 2007).

The LC represents an innovation posing challenges and opportunities for many operators involved in freight transport, logistics, manufacturing and trade, while particularly offering to the local productive systems the best solutions in terms of transportation, warehousing and logistics activities (Iannone et al., 2007). The key functions in LCs identified to facilitate the RL chain are; (1) Coordination and Co-operation, (2) Centralization, (3) Consolidation, (4) 3rd Party Collaboration and (5) Integration.

3. Logistics Center Opportunities in Reverse Logistics

Stock et al. (2006, p. 16) best describes the strategic change taking place; "RL should not be viewed as a costly side-show to normal operations. Rather it should be seen as an opportunity to build competitive advantage" (Genchev, 2009). The consolidation of RL functions under the organized structure of LC would provide a wide range of opportunities and benefits for the organizations.

Coordination and Cooperation: It is an underlying assumption in distribution, logistics and supply chain management that a higher level of coordination between the actors is superior to a lower, and will in turn lead to increased performance. The empirical results indicate that well functioning coordination and cooperation mechanisms across flows decrease costs and increase the level of service.

Centralization: The presence of LCs in the RL network creates a framework which allows firms to operate within a wide variety of geographical, economic and political context and turn into an effective network for multimodal transport services operating as the main leg of an international flow of goods.

Consolidation: LCs are one of the urban freight infrastructures designed to promote consolidated delivery, in harmony with the facilitation of logistics activities (Wisetjindawat, 2010).

3rd Party Reverse Logistics Collaboration: The 3PLs providers have expertise and a broader view of how RL works because they work with multiple firms and industries. They can leverage their knowledge and software to benefit everyone. Typical services outsourced to 3PLs providers are transportation, warehousing, inventory, value-added service, information services and reengineering of the supply chain (Du and Evans, 2008).

Integration: Dowlatshahi (2000) argues that "from design through manufacture to consumer, firms should explore and integrate RL as a viable business option in the product life cycle." The integration of transport and logistics activities in a single facility is more economic and efficient than several smaller intermodal terminals.

4. Overcoming Reverse Logistics Challenges through Logistics Centers

4.1. Lack of information and technological systems

Given the complexity of RL supply chains and the uncertainty return flows, effective information technology (IT) is necessary to support the management of return flows. Efficient information systems are supportive for individually tracking and tracing the returns of the product, linking with the previous sales (Biehl et al., 2007). IT lays in the very base of the LCs, constituting the main capability for effective information flow, transparency among the partner organizations and through its integrative ability it could be incorporated into the RL framework (Daugherty et al., 2002).

4.2. Problems with product quality

Another important barrier affecting RL is the quality of the end-of-use/end-of-life returned products. LCs serving as the hubs located in the intersection points of intermodal transportation as well as urban freight centers would establish inspection units where the control, refurbishing and in case repair of the returned products may be performed (Cerrano et al., 2008). These inspection units or a part of them may also serve as outlets for the reselling of non-repairable items preventing extra transportation to any other outlets, protecting the environment and serving for the customer satisfaction.

4.3. Resistance to change to Reverse Logistics

A main barrier seen in the implementation of the RL is the resistance to change. However RL requires a radical change in the mindset and practice (Rimiene and Grundey, 2007). The realization of RL-LC structure's benefits would create waves of popularity and encourage those firms having reluctance to get involved in this centralized structure to actually be part. The pioneering firms would serve as the mirrors of functional benefits provided by this system. The so called "follower" firms would in time acknowledge the gain they would have besides the entrepreneurial behavior triggered by the existence of other firms which makes the new entrants realize the reduced risk, reduced cost and collective power they would have.

4.4. Lack of appropriate performance metrics

Lack of performance metrics is a major barrier to the RL programs. Performance metrics form the basis of integrated work management systems. Successful RL programs will create performance measurement systems that provide data as to whether the designed RL is performing up to the expectations. LCs are the standardizing foundation for the firms included in this system (Meidute, 2005). The determination of standards is made collaboratively allowing the improved standards for firms of small/medium size since it accentuates the need to reach the longitudinal, dynamic and progressive level of the top-performing firm. Hence even the firms having low levels of performance and standards would benefit from the high and standardized performance of the large and stabilized firms.

4.5. Lack of training and education

LCs is good resources for open innovation and can be used for educational purposes. Education can be both at the enterprise and personnel level. The organizations have wide opportunities of learning from each other, widening their domains of innovation, acknowledging and adapting to higher levels of technological or process based standards. On the personnel level of the inter-firm open innovation, the trainings organized by the top management of the logistics villages would span a larger mass of personnel serving both for better qualified and standardized levels of skills among the RL processes involved in logistics villages (Iannone et al., 2007).

4.6. Financial constraints

The cost of RL is 9 times higher than the cost of forward logistics because the distribution of the new manufactured goods can be consolidated but as proposed earlier the consolidation of reverse delivery/shipment is possible with the involvement of multiple firms and shared resources (e.g. trucks, inspection units, technology, equipment, facility). One of the main objectives in the location selection process of LCs is to select a site that offers the lowest possible transportation costs with the easiest access to the greatest number of customers (Ravi and Shankar, 2007).

5. Discussion and Conclusion

The focus of this study is to emphasize the role LCs would have in the RL chain. It's worth mentioning here that the role of RL in the LC concept constitutes a gap in the literature. This study aims at addressing this gap by identifying the barriers faced in the adoption of RL and the respective overcoming schemas provided by the LCs. Five major aspects are endowed by the construction of a logistics village and the inclusion of RL activities in this central organizing, operational and administrative hub namely; coordination and cooperation, centralization, consolidation, 3rd party RL collaboration and integration. This infrastructure would facilitate accessibility being in the intersection of multi-modal transportation and increases involvement in the RL with a lower economic investment. Concurrently higher economic growth would be reached with shared resource usage, open innovation sources, collaborative process improvement, consolidated reverse shipments and repair units, higher competitive advantage being part of an associative business network, close tracking of competitors as well as customers and opportunities to expand by partnerships and mergers. Moreover successful LCs will effectively coordinate all the RL processes, focus on recapturing value or proper disposal of products, create environmental friendly products/processes, and create performance measurement systems that provide data as to whether the designed RL is performing up to the expectations of the LC.

In order for these conditions to be satisfied efficient leadership is needed in the provision of clear vision and value to RL programs. The top management should demonstrate commitment in being part of an integrative LC for the RL activities, which also addresses other organizational goals by integrating all the members of the supply chain. There should be continuous support for this type of infrastructure in the effective management of RL' strategic and action plans (Genchev, 2009). To analyze the interaction between the barriers and RL adoption the theoretical foundation of the discussion is grounded in the LC concept. Building on the need to overcome these barriers for the success in RL programs logistics villages' features are proposed as solutions. However including a case study and a qualitative research methodology in order to assess the real life situation regarding the establishment of RL in the context of LCs may further expand this study.

References

Alshamrani, A., Mathur, K., & Ballou, R. H. (2007). Reverse logistics: simultaneous design of delivery routes and returns strategies. *Computers & Operations Research*, 34, 595–619.

Autry, C. W. (2005). Formalization of reverse logistics programs: A strategy for managing liberalized returns. *Industrial Marketing Management,* 34, 749-757.

Biehl, M., Prater, E., & Realff, M. J. (2007). Assessing performance and uncertainty in developing carpet reverse logistics systems. *Computers & Operations Research,* 34, 443–463.

Ballis, A. (2006). Freight Villages: Warehouse Design and Rail Link Aspects. *Transportation Research Record: Journal of the Transportation Research Board*, 1966(1), 27-33.

Cheng, Y. H. & Lee, F. (2010). Outsourcing reverse logistics of high-tech manufacturing firms by using a systematic decision-making approach: TFT-LCD sector in Taiwan. *Industrial Marketing Management,* 39, 1111–1119.

Daugherty, P. J., Myers, M. B., & Richey, R. G. (2002). Information support for reverse logistics: the influence of relationship commitment, *Journal of Business Logistics,* 23 (1), 85–106.

Dowlatshahi S. (2000). Developing a theory of reverse logistics. *Interfaces*, 30(3), 143–55.

Du, F. & Evans, G. W. (2008). A bi-objective reverse logistics network analysis for post-sale service. *Computers and Operations Research*, 35, 2617-2634.

Flygansvær, B. M., Gadde, L. E., & Haugland, S. A. (2008). Coordinated action in reverse distribution systems. *International Journal of Physical Distribution & Logistics Management*, 38(1), 5 – 20.

Genchev, E. S. (2009). Reverse logistics program design: A company study. *Business Horizons*, 52, 139-148.

Gonzalez-Torre, P. L., Adenso-Diaz, B., & Artiba, H. (2004). Environmental and reverse logistics policies in European bottling and packaging firms. *International Journal of Production Economics,* 88, 95–104.

Horvath, P. A., Autry, C. W., & Wilcox, W. E. (2005). Liquidity implications of reverse logistics for retailers: A Markov chain approach. *Journal of Retailing,* 81 (3), 191–203.

Hu, T. L., Sheu, J. B., and Huang, K. H. A reverse logistics cost minimization model for the treatment of hazardous wastes. *Transportation Research Part E*, 38, 457–473.

Jayaraman, V., Patterson, R. A., & Rolland, E. (2003). The design of reverse distribution networks: Models and solution procedures. *European Journal of Operational Research,* 150(1), 128-149.

Jennings, A. A., & Scholar, R. L. (1984). Hazardous waste disposal network analysis. *Journal of Environmental Engineering,* 110(2), 325–42.

Kapros, S., K. Panou, & Tsamboulas, D. A. (2005). Multicriteria Approach to the Evaluation of Intermodal Freight Villages. *Transportation Research Record: Journal of the Transportation Research Board,* 1906(1), 56-63.

Konings, J. W. (1994). Integrated Centers for the Transshipment Storage, Collection, Distribution of Goods. *Transport Policy*, 3(1/2), 3-11.

Mok, H. S., Kim, H. J., & Moon, K. S. (1997). Disassemblability of mechanical parts in automobile for recycling. *Computers and Industrial Engineering,* 33 (3–4), 621–624.

Nathanail, E. (2007). Developing an Integrated Logistics Terminal Network in the CADSES. *Transition Studies Review*, 14(1), 125-146.

Nema, A. K., & Gupta, S. K. Optimization of regional hazardous waste management systems: an improved formulation. *Waste Management*, 19, 441–51.

Peirce, J. J., & Davidson, G. M. (1982). Linear programming in hazardous waste management. *Journal of Environmental Engineering,*108(5), 1014–26.

Pokharel, S., & Mutha, A. (2009). Perspectives in reverse logistics: A review. *Resources, Conservation and Recycling,* 53, 175–18.

Ravi, V., & Shankar, R. (2005). Analysis of interactions among the barriers of reverse logistics. *Technological Forecasting and Social Change,* 72, 1011–1029.

Rimienė, K., & Grundey, D. (2007). Logistics Center Concept through Evolution and Definition, Engineering Economics, 54 (4), 87-95.

Rogers,D. S.& Tibben-Lembke,R. S. (1999). *Going backwards: Reverse logistics trends and practices*. The University of Nevada, Reno, Center for Logistics Management, Pittsburgh, PA: Reverse Logistics Executive Council.

Srivastava S. K. (2008). Network design for reverse logistics. *Omega: The International Journal of Management Science,* 36 (4), 535–548.

Stock, J. A. (1998). *Development and Implementation of Reverse Logistics Programs*. Council of Logistics Management: Oak Brook, IL.

Tsamboulas, D. & Kapros, S. (2003). Freight village evaluation under uncertainty with public and private financing. *Transport Policy*, 10(2), 141-156.

Zeiger, A. (2003). Reverse logistics: the new priority? *Frontline Solutions*, 4(11), 20.